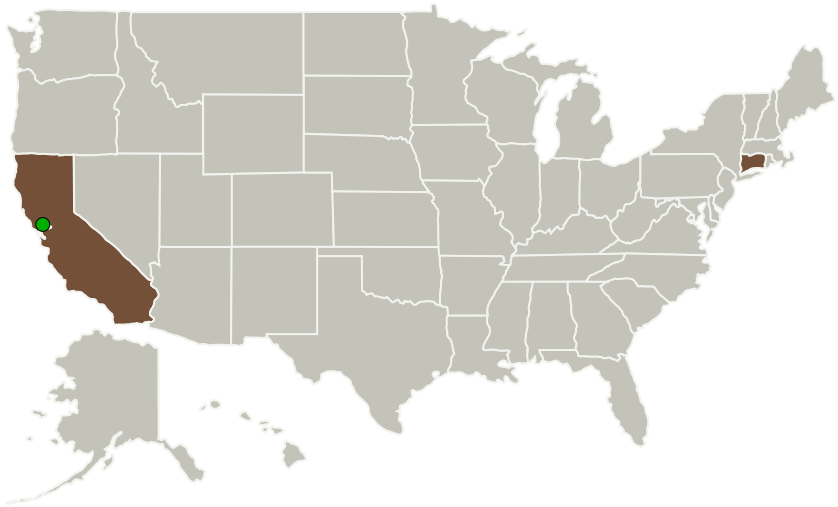
Integrated System Health Management for Flexible Exploration, Phase II

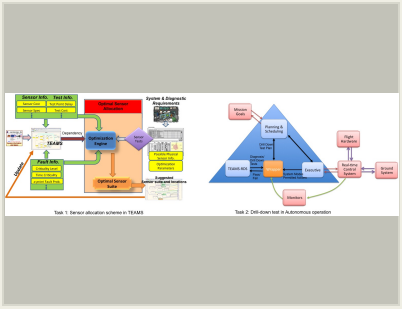
Completed Technology Project (2013 - 2015)

Project Introduction

Long-duration robotic and manned space missions have a number of unique requirements for mission success. These include ultra-high reliability, safety, sustainability and affordability of launch vehicles and spacecraft. These requirements, in turn, are allocated among critical subsystems, such as engines, propellants, structures, software systems, thermal protection, power, avionics, life support, guidance, communication and navigation. In this vein, novel integrated system health management (ISHM) technologies that evolve with the system life-cycle, viz., concept-> design-> development-> production-> operations and training, are essential for meeting the requirements of safe and ultra-reliable, sustainable and affordable launch vehicles and spacecraft. To improve the ISHM process, QSI proposes to emphasize advancement in the two following areas: 1) generation/selection of an optimal sensor suite for the system based on user selected performance requirements and system level constraints, and 2) enhancement of a drill-down diagnosis/next best test capability in terms of algorithms that can be implemented for low power, low memory CPU/hardware that are available for embedded diagnosis using TEAMS-RT. Outcome technologies of the proposed focus are expected to allow an improved ISHM process to systemically trade-off prevention, detection, diagnosis, decision, and response strategies to mitigate the failure effects, as well as enhance FM development process by improved/new capabilities of TEAMS® tool set.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Qualtech Systems, Inc.	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Rocky Hill, Connecticut
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Connecticut

Project Transitions

July 2013: Project Start

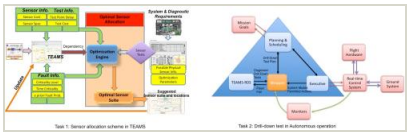
July 2015: Closed out

Closeout Summary: Integrated System Health Management for Flexible Explor ation, Phase II Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/137328)*

Images



Briefing Chart Image
Integrated System Health Management for Flexible Exploration, Phase II
(https://techport.nasa.gov/image/130405)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Qualtech Systems, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Sudipto Ghoshal

Co-Investigator:
Sudipto Ghoshal

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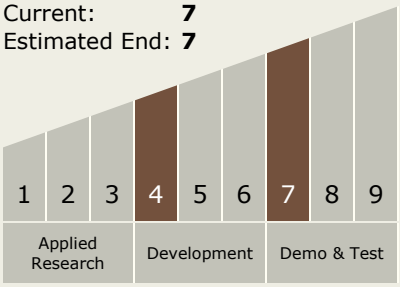
Technology Maturity (TRL)

Start: **4**
Current: **7**
Estimated End: **7**



Technology Areas

Primary:

- TX10 Autonomous Systems
  - TX10.2 Reasoning and Acting
    - TX10.2.3 Motion Planning

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System